

REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application and for the courtesies extended during the recent telephonic interview.

Information Disclosure Statement

Applicant respectfully requests the Examiner to sign and return PTO Form 1449 submitted on February 23, 2004.

Disposition of Claims

Claims 1 and 5-14 are pending in this application. Claims 1, 7, and 8 are independent. Claims 5, 6, and 12-14 depend directly from claim 1. Claims 9-11 depend directly from claim 8.

New Claims

Claims 12-14 are new. Support for these claims can be found, for example, in Figures 4C, 5, and 8.

Rejection(s) under 35 U.S.C § 103

Claims 1, and 5-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,937,493 issued to Nellissen (hereinafter "Nellissen") in view of U.S. Patent No. 5,584,120 issued to Roberts (hereinafter "Roberts"). Claim 1 has been amended to clarify the invention recited. Support for this amendment can be found, for

example, on Page 8, Paragraph 0019 of the Specification. Claims 5 and 6 have been amended to correspond to original claims 5 and 6. Claim 7 has been amended to include the limitations of the second surface of claim 1. Support for this amendment can be found, for example, in Figures 4C and 8. Claim 8 has been amended to clarify the invention recited. Support for this amendment can be found, for example, in Figure 4C. To the extent that this rejection still applies to the claims as amended, the rejection is respectfully traversed.

Specifically, claim 1, as amended, relates to a multilayer circuit board, including a substrate having a first surface and a second surface extending from an end of the first surface at a required angle relative to the first surface, a multilayer circuit formed on the first surface of said substrate and composed of a plurality of circuit layers, each of which is provided with a conductive layer having a required circuit pattern and an insulation layer formed on said conductive layer by film formation, a second conductive layer formed on the second surface of said substrate, by which said conductive layer of one of said circuit layers is electrically connected to said conductive layer of another one of said circuit layers, wherein the second surface of said substrate includes a side surface of a projection on the first surface, *wherein the said first surface is a higher level surface than a level surface of the second surface of said substrate*, and the second surface further includes a side surface of said substrate, and wherein the required angle between the first and second surfaces is an obtuse angle.

Nellissen, either separately or in combination with Roberts, does not teach or suggest the limitation of claim 1 that the “first surface is a higher level surface than a level surface of the second surface of said substrate.” For at least this reason amended

claim 1 is patentable over Nellissen in view of Roberts. Because claims 5, 6, and 12-14 depend directly from claim 1, they are patentable for at least the same reason.

Further, the present invention as recited in claim 1 relates to a conductive layer formed on a second surface of a substrate that electrically connects at least two conductive layers of a multilayer circuit. In one embodiment, the second conductive layer **20** formed on the second surface of the substrate (the side surface of the projection **17**) electrically connects two conducting layers (**24, 26**) separated by the insulating layer **34**. (See Figure 4C). Thus, the second conductive layer formed on the side surface of projection **17** makes a layer-to-layer connection between conductive layers of the multilayer circuit.

In contrast, Nellissen discloses a multilayer circuit that does *not* include layer-to-layer connections between conductive layers of the circuit. (See Figures 4, 5, 6). As shown in Figure 4, Nellissen discloses a conductive layer **13** deposited on a first surface **100** and a second surface **200** (a side surface of a protrusion **5**) at a direction “A” that subtends a non-perpendicular acute angle of approximately 50 degrees with the plane of a substrate **9**. Then, as shown in Figure 5, an insulating layer **15** is formed on the conductive layer **13** and exposed surfaces of the substrate **9**. Next, as Figure 6 shows, a second conductive layer **19** is deposited on the insulating layer **15** at a direction “B” that is co-planar with “A” and also subtends an acute angle of approximately 50 degrees with the plane of the substrate **9**. Because the conductive layer **13** is entirely separated from the second conductive layer **19** by the insulating layer **15**, the portion of the conductive layer **13** deposited on the side surface of the protrusion **5** does not make an electrical connection (layer-to-layer connection) between the conductive layers (**13, 19**).

Further, the contact pad disclosed by Nellissen is not a conductive layer formed on a surface of the substrate that electrically connects conductive layers of a multilayer circuit. As shown in Figure 14, the contact pads 35' disposed on the planed surface of the alternating conductive (13, 19, 23) and insulating (15, 21, 25) layers electrically connect conductive layers of the multilayer circuit. The contact pads 35' are placed on the external surface of the layers of the multilayer circuit and, thus, are not conductive layers integrally formed with the circuit. Therefore, in the multilayer circuit that Nellissen discloses, there exists no conductive layer formed on any surface of the substrate that provides an electrical connection between conductive layers of the multilayer circuit.

For the above stated reasons, Nellissen does not teach or suggest a conductive layer formed on a surface of a substrate that electrically connects conductive layers of a multilayer circuit. Therefore, Nellissen does not teach or suggest the following limitation of claim 1, "a second conductive layer formed on the second surface of said substrate, by which said conductive layer of one of said circuit layers is electrically connected to said conductive layer of another one of said circuit layers, wherein the second surface of said substrate includes a side surface of a projection on the first surface." Therefore, claim 1 is not obvious over Nellissen.

Further, Roberts does not disclose what Nellissen lacks. Specifically, Roberts discloses a method for manufacturing printed circuit boards. However, Roberts does not teach or suggest a multilayer circuit board having layer-to-layer connections as recited in amended claim 1. Thus, in view of the above, claim 1 is patentable over Nellissen in view of Roberts. Dependent claims 5, 6, and 12-14 are patentable for at least the same

reasons.

Claim 7 has been amended to include the limitations of the second surface from claim 1. Because claim 7 has essentially the same limitations as claim 1, it is patentable for at least the same reasons.

Claim 8 has been amended to clarify the invention recited. Specifically, claim 8, as amended, relates to a multilayer circuit, including a substrate having a first surface and a projection formed on the first surface, a side surface of said projection extending at an obtuse angle relative to the first surface, a pair of multilayer circuits formed on the first surface at both sides of said projection, each of said multilayer circuits composed of a plurality of circuit layers, each of which is provided with a conductive layer having a required circuit pattern and an insulation layer formed on said conductive layer by film formation, a second conductive layer successively formed on side and top surfaces of said projection, wherein said conductive layer of one of said circuit is electrically connected to said conductive layer of another one of said circuit layers by said second conductive layer on the side surface of said projection, and simultaneously one of the pair of multilayer circuits is electrically connected to the other one by said conductive layer on the side and top surfaces of said projection. The multilayer circuit recited by claim 8 and shown, for example, in Figure 4C, includes a second conductive layer **20** formed on the side and top surfaces of a projection **17** on a second surface. The portion of the second conductive layer **20** formed on the side surface of the projection **17** electrically connects conductive layers (**24**, **26**) of a multilayer circuit formed on a side of the projection **17**, and simultaneously, the second conductive layer **20** electrically connects adjacent multilayer circuits formed on each side of the projection **17**.

In contrast, Nellissen discloses, as shown in Figure 13, a top electrical contact layer 33' formed to make an electrical connection between conductive layers (13, 19) of a single multilayer circuit, but does not disclose a conductive layer on the top surface of a projection 5 that electrically connects adjacent multilayer circuits formed at both sides of the projection 5. The multilayer circuits formed at both sides of the projection 5 are electrically isolated from each other. Thus, Nellissen fails to disclose the following limitation of amended claim 8, "simultaneously one of the pair of multilayer circuits is electrically connected to the other one by said conductive layer on the side and top surfaces of said projection."

Roberts fails to teach or suggest that which Nellissen is lacking. Therefore, claim 8 is patentable over Nellissen and Roberts, whether considered separately or in combination. Because claims 9-11 depend directly from claim 8, they are patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference 11411.002001).

Respectfully submitted,

Date: _____

7/12/04



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